

# CST Sec 5 2014-15

## TRANSFORMATIONS

### All Exam Questions

- 1) The vertices of quadrilateral ABCD on a Cartesian plane have the following coordinates: A(-6, 8), B(-9, 5), C(-3, 4), D(-3, 6) 2010-14

The following composite transformation is used to produce quadrilateral A'B'C'D':

①  $\Delta X (x, y) \rightarrow (x, -y) \quad r(0, 90^\circ) \circ S_x$

NB You must do the

Give the coordinates of the following vertices.

②  $r_{90^\circ}$

$(x, y) \rightarrow (-y, x)$

A(-6, 8)  
B(-9, 5)  
C(-3, 4)  
D(-3, 6)

A'(-6, -8)  
B'(-9, -5)  
C'(-3, -4)  
D'(-3, -6)

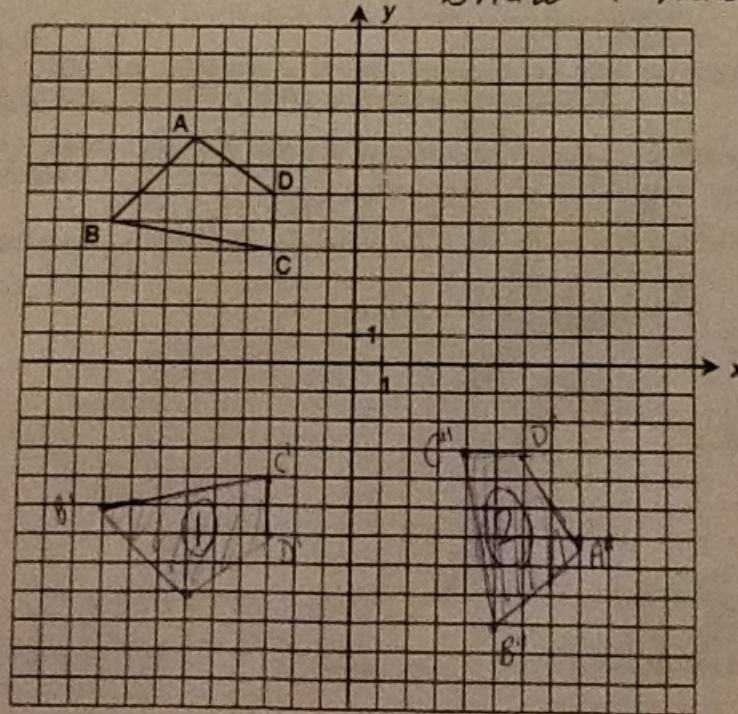
A\*(8, -6)  
B\*(5, -9)  
C\*(4, -3)  
D\*(6, -3)

reflection FIRST. Then do the ROTATION

Construct the image of quadrilateral ABCD by applying the given composite transformation.

DRAW & Label

both new quads.



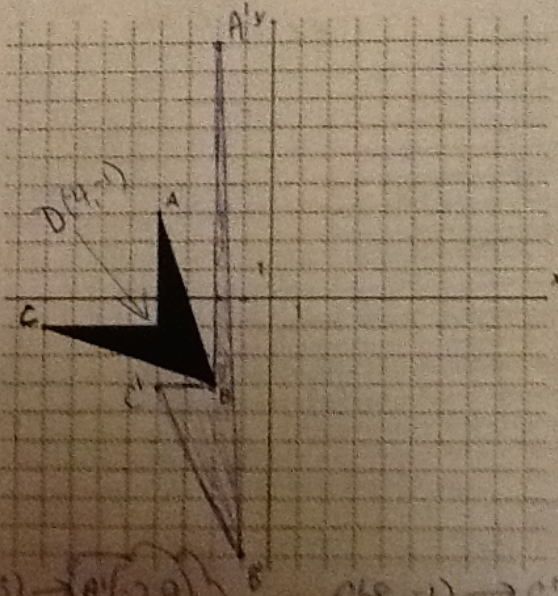


3 The Polygon below undergoes a horizontal scale change of 0.5 and a vertical scale change of 3.

$$(x, y) \longrightarrow (0.5x, 3y)$$

- A(-4, 3)
- B(-2, 3)
- C(-8, -1)
- D(-4, -1)

- ① multiply all x-values by 0.5
- ② multiply all y-values by 3



DRAW & Label the Scale Change.

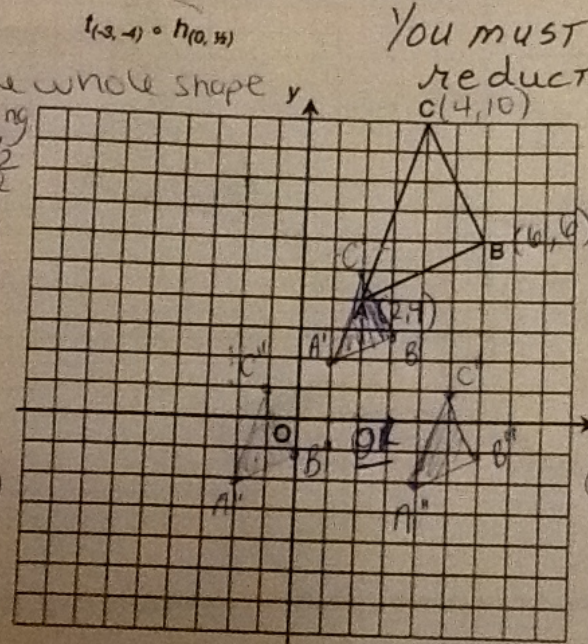
$A(-4, 3) \rightarrow A'(-2, 9)$        $C(-8, -1) \rightarrow C'(-4, -3)$   
 $B(-2, 3) \rightarrow B'(-1, 9)$        $D(-4, -1) \rightarrow D'(-2, -3)$

What are the coordinates of A' and B' of the image?

4) Given triangle ABC where A(2, 4), B(6, 6), C(4, 10), construct its image under the following composite of transformations:

- ① Reduce the whole shape by multiplying x and y by 1/2 (or dividing all numbers by 2)

$(2, 4) \rightarrow (1, 2)$   
 $(6, 6) \rightarrow (3, 3)$   
 $(4, 10) \rightarrow (2, 5)$   
 ~~$(x, y) \rightarrow (x-3, y-4)$~~   
 $(1, 2) \rightarrow (-2, -2)$   
 $(3, 3) \rightarrow (0, -1)$   
 $(2, 5) \rightarrow (-1, 1)$



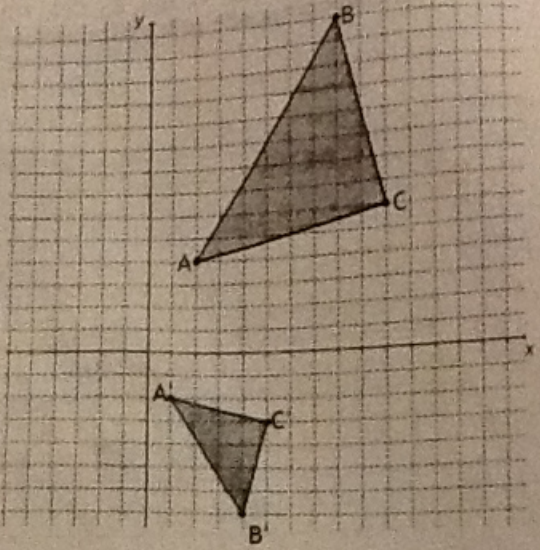
You must do the reduction of 1/2 FIRST Then do the translation  $T(3, -4)$

②  $(x+3, y-4)$   
 $A(1, 2) \rightarrow (4, -2)$   
 $B(3, 3) \rightarrow (6, -1)$   
 $C(2, 5) \rightarrow (5, 1)$

5) Polygon ABCDE has undergone a similarity transformation using the origin as the center of similarity. Did the negative

6)

$\triangle ABC$ : original  
 $\triangle A'B'C'$ : image



Well, it's getting smaller so we can cross out the ones where it's getting bigger

Then if you look at the shape and where the points have ended up we can see it was flipped

Which rules for the geometric transformations transform figure 1 to figure 2?

- A)  $r_{(0,0)}: (x, y) \rightarrow (y, -x)$  then  $h_{(0,2)}: (x, y) \rightarrow (2x, 2y)$
- B)  $r_{(0,0)}: (x, y) \rightarrow (-y, x)$  then  $h_{(0,1/2)}: (x, y) \rightarrow (1/2x, 1/2y)$
- C)  $s_2: (x, y) \rightarrow (x, -y)$  then  $h_{(0,1/2)}: (x, y) \rightarrow (1/2x, 1/2y)$
- D)  $s_2: (x, y) \rightarrow (x, -y)$  then  $h_{(0,2)}: (x, y) \rightarrow (2x, 2y)$

7) A line segment AB has endpoints A(-3, 3) and B(0, -6). It undergoes the following transformations:

FIRST  $t(x, y) \rightarrow (x+3, y-6)$  then  $h_{(0, 1/3)}(x, y) \rightarrow \left(\frac{x}{3}, \frac{y}{3}\right)$  OR

this is the same as  $h(0, \frac{1}{3})$

What are the new endpoints of the line segment?

- A)  $A(-3, 3) \rightarrow (0, -3)$   
 $B(0, -6) \rightarrow (3, -12)$
- B) divide all by 3  
 $A(0, -3) \rightarrow (0, -1)$   
 $B(1, -12) \rightarrow (1, -4)$



9) → Which one involves a shape getting smaller?  
 Which one of the following geometric transformation rules must be applied to obtain the contraction of the initial figure? Reduction.

- A)  $(x, y) \mapsto (x, y - 4)$
- B)  $(x, y) \mapsto (x, -y)$
- C)  $(x, y) \mapsto (3x, 3y)$
- D)  $(x, y) \mapsto \left(\frac{1}{2}x, y\right)$

10) The vertices of figure ABCD on a Cartesian plane have the following coordinates: A (-4, -2) ; B (-10, -4) ; C (-2, -10) ; D (-6, -4).

This figure undergoes the composite transformation below:  
 must be done first  
 Second.  $(0, +90^\circ) \circ S_{y\text{-axis}}$   
 (2)  $(-y, x)$       (1)  $S_y$   $(x, y) \mapsto (-x, y)$

- a) Give the coordinates of the following vertices.
- |             |             |             |
|-------------|-------------|-------------|
| A (-4, -2)  | A' (4, -2)  | A'' (2, 4)  |
| B (-10, -4) | B' (10, -4) | B'' (4, 10) |
| C (-2, -10) | C' (2, -10) | C'' (10, 2) |
| D (-6, -4)  | D' (6, -4)  | D'' (4, 6)  |

b) Draw and label the image of figure ABCD on the graph below by applying the given composite transformation. Both diagrams drawn + labelled

